

## **DARPA-SN-10-05 DARPA/IPTO**

### **Flow-Based Information Theoretic Tracking (FITT)**

#### **Proposers Day – November 18, 2009**

##### **Rosslyn, VA**

The Defense Advanced Research Projects Agency (DARPA) will conduct a briefing in support of the anticipated FITT program Broad Agency Announcement (BAA). This announcement is issued solely for information and program planning purposes. When released, the BAA will be found on the Federal Business Opportunities website, <http://www.fedbizopps.gov>.

Attendance at the Proposers Day is voluntary and is not required to propose to subsequent Broad Agency Announcements (if any) or research solicitations (if any) on this topic. The Proposers Day does not constitute a formal solicitation for proposals or abstracts. In accordance with FAR 15.201(e), responses to this notice are not offers and cannot be accepted by the Government to form a binding contract. DARPA will not provide reimbursement for costs incurred to participate in this Proposers Day. Interested parties to this notice are cautioned that nothing herein obligates the Government to issue a solicitation.

#### **BACKGROUND**

The envisioned Flow-based Information Theory Tracking (FITT) program establishes a new basis for tracking in urban environments by combining the well established science of traffic flow theory with advanced modeling and flow-based tracking algorithm development to enable dramatically improved track duration while still operating in real-time.

As early as the 1930's, the mathematical characterization of measured traffic data has demonstrated the fluid nature of aggregate ground traffic and the relationship between the road network and driver behaviors. Existing DoD traffic models used in today's tracking algorithms are primarily kinematic-constraint driven and limited in that they typically do not account for detailed road structure (e.g., intersection signaling structure), on-line derivable traffic behaviors (e.g., typical traffic speeds and densities as a function of position and time), or vehicle interaction dynamics (e.g., reduced speed at higher densities, a situation in which traffic behaves, in some ways, similar to a fluid).

The FITT program assumes that a sensor (e.g., radar or a set of cameras) observes a ground area and provides target detection reports. These detection reports include target location and, depending on the sensor, may include additional information such as velocity, radar cross-section (RCS) or other radar features, spectral characteristics, or 2-D images. The FITT algorithms will use this information to track the ensemble of the vehicles.

As ground target densities increase in more urban areas, existing trackers often lose target track due to nearby confusers, and operate with limited hypothesis depths to avoid computational overload. In addition, urban traffic offers many constraints that conventional trackers do not

exploit. For example, ground vehicles cannot pass thru each other, they cannot go beyond the bounds of typical urban roads, and they generally obey cultural conventions and traffic laws. Under these constraints, ground traffic behaves somewhat like a fluid, and the FITT Program expects to develop new tracking algorithms based on this fluidic viewpoint.

In urban traffic, there are common situations where there is little useful information to be gained from frequent target updates. For example, a vehicle boxed in by other vehicles on a limited-access road is unable to make any dramatic maneuvers. There are other situations where an additional sensor update can provide critical information. For example, whether or not a vehicle slows as it approaches an intersection serves as an indication of its intentions. This is the “information theoretic” aspect of FITT. The tracking algorithm must provide feedback to the sensors so that the limited sensor resources are used to extract the maximum possible information from the target ensemble. This is the opposite of the conventional approach where the tracker passively processes data fed from the sensor.

The goals of the Proposers Day are threefold: 1) to familiarize participants with DARPA’s interest in the FITT technology, 2) to identify potential offerors and promote understanding of the BAA proposal requirements, and 3) to promote discussion of synergistic capabilities among potential program participants. It is DARPA’s desire to facilitate the formation of strong teams and business relationships in order to develop comprehensive, quality responses to any potential DARPA solicitation. Information on the anticipated FITT BAA will be available at [http://www.darpa.mil/ipto/solicit/solicit\\_open.asp](http://www.darpa.mil/ipto/solicit/solicit_open.asp) following the publication of the BAA in FedBizOpps. It is anticipated that the FITT BAA will be released after Proposers Day. Materials presented at the Proposers Day will be made available at: [http://www.darpa.mil/ipto/solicit/solicit\\_open.asp](http://www.darpa.mil/ipto/solicit/solicit_open.asp).

## **AGENDA**

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| 9:00 – 10:00 am    | Opening Remarks and Program Manager Presentation<br>This session will include the introduction of the DARPA FITT Program vision and philosophy, objectives and goals. |
| 10:00 – 10:15 am   | Contracting Officer Presentation<br>This session will cover acquisition details related to the BAA process.   |
| 10:15 – 10:30 am   | Security Officer Presentation<br>This session will cover submitting classified proposals.   |
| 10:30 – 10:45 am   | Break   |
| 10:45 – 12:00 noon | AFRL Presentation on Tracking State-of-the-Art  |
| 12:00 – 5:00 pm    | Sidebar discussions   |

## **REGISTRATION**

Registration must be completed by **November 13, 2009** via the following site – <https://safe.sysplan.com/ipto/fitt>. Questions or special needs should be indicated in the comments section. Non-US citizens are required to submit a DARPA Form 60 “Foreign National Visit Request” to DARPA no later than **November 13, 2009** by email to [DARPA-SN-10-05@darpa.mil](mailto:DARPA-SN-10-05@darpa.mil) or fax to 703-741-0230. All attendees will be required to present a Government-issued photo identification upon entry to the event.

## **LOCATION**

1000 Wilson Blvd  
30<sup>th</sup> Floor  
Rosslyn VA 22209

## **HOTEL INFORMATION (provided as a courtesy)**

Arlington Hyatt  
1325 Wilson Blvd  
Arlington, VA  
703-525-1234

The Westin Arlington Gateway  
801 N. Glebe Road  
Arlington, VA  
703-717-6200

Holiday Inn - Ballston  
4610 N. Fairfax Drive  
Arlington, VA  
703-243-9800

Hilton - Arlington  
950 N. Stafford Street  
Arlington, VA  
703-528-6000

Comfort Inn - Ballston  
1211 N. Glebe Road  
Arlington, VA  
703-247-3399